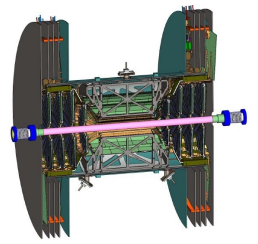
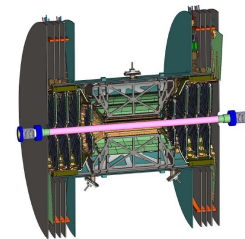


Electrical Integration WBS 1.8



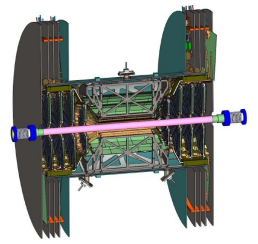
Eric J. Mannel
Columbia University
Electronics Project Engineer
VTX and FVTX

Electronics Integration



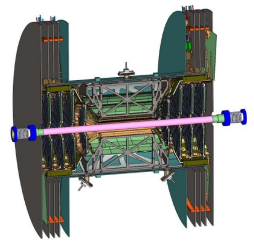
- Outline
 - Review Process and Status
 - DAQ Integration
 - Power and Ground
 - Interlocks
 - Rack Allocation
 - DCM-2 Status
 - Installation Plan
 - Summary

Electronics Review Process



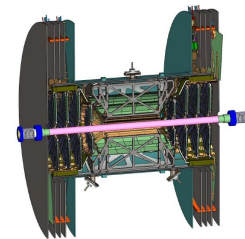
- Design Review Process:
 - Coordinate review with subsystem manager as design approaches completion.
 - Require all appropriate documentation to be posted for future reference (FVTX Web Page):
 - Convene a PHENIX internal review Panel
 - Generate an “Action” list of issues that need to be addressed
 - Verify that all technical questions are properly addressed.
 - Convene follow up session of review panel if necessary.
- Electrical Safety Reviews:
 - Held concurrent with the final production design review.
 - Contact PHENIX Safety officer to request a safety review
 - Work with subsystem manager to assemble documentation.
 - Meet with safety & design teams to resolve safety questions.

Electronics Review Process



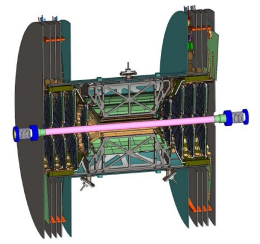
- Reviews held to date:
 - FPHX Design reviews held in February, March, and April 2008
 - Conclusion of the review process was to submit the chip in June 2008
 - FVTX Overall Electronics Review, August 2008
 - Summary report with suggestions and concerns was submitted to the FVTX group in August 2008
 - Preliminary Safety Review with C-AD July 2009
 - HDI production review, December 2009
 - FEM/FEM Interface design review, June 2010
- Pending Design Reviews
 - ROC design and layout review, Nov/Dec 2010
 - Final Safety and Operational Readiness Review after installation.

Electronics DAQ Integration



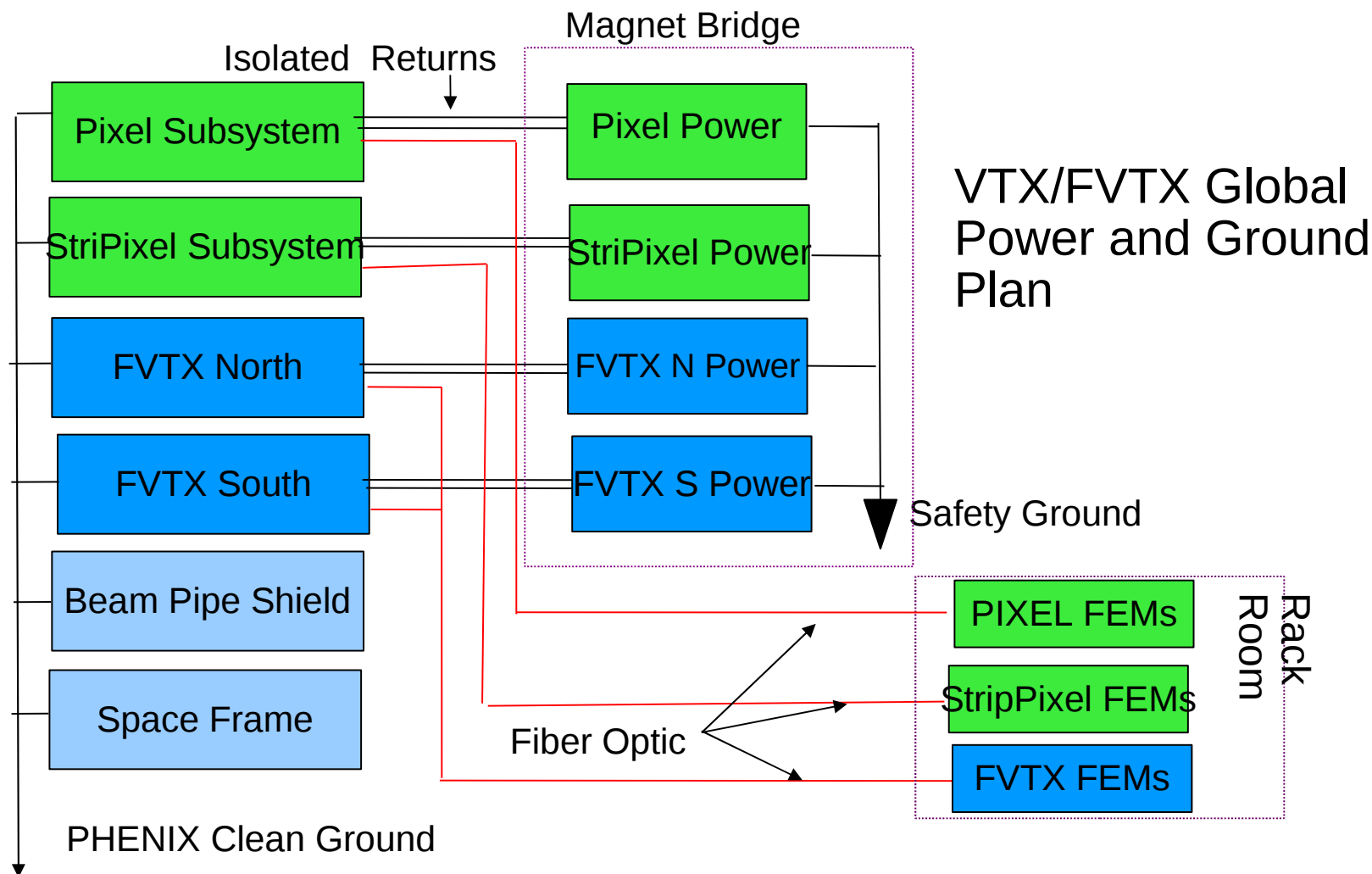
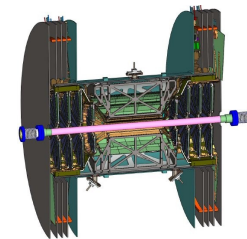
- PHENIX DAQ/Online Integration
 - Coordinate meetings with PHENIX DAQ and Online groups
 - Assist with providing interface specifications
 - Work with design teams to make sure that all interfaces are compatible with PHENIX DAQ and Online systems.
 - Had initial meeting in January 2008 to review the general concept
 - Follow up discussion January 2009
 - Additional meetings and discussions occur as required
 - Start Run Control software development Spring 2011
 - Expert System for testing in place.

Power and Ground

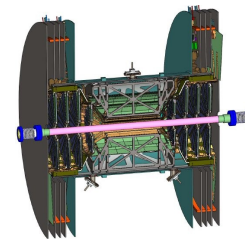


- Power and Ground Plan
 - Common plan for the VTX and FVTX detectors
 - VTX Subsystems and FVTX Isolated from each other and other PHENIX systems
 - Star ground plan
 - Shield around beam pipe and enclosure
 - Multiple options for point of ground connections
 - Single point connection to PHENIX clean ground
 - Optical connections to Rack Room/DAQ
 - AC isolation of LV Bias returns

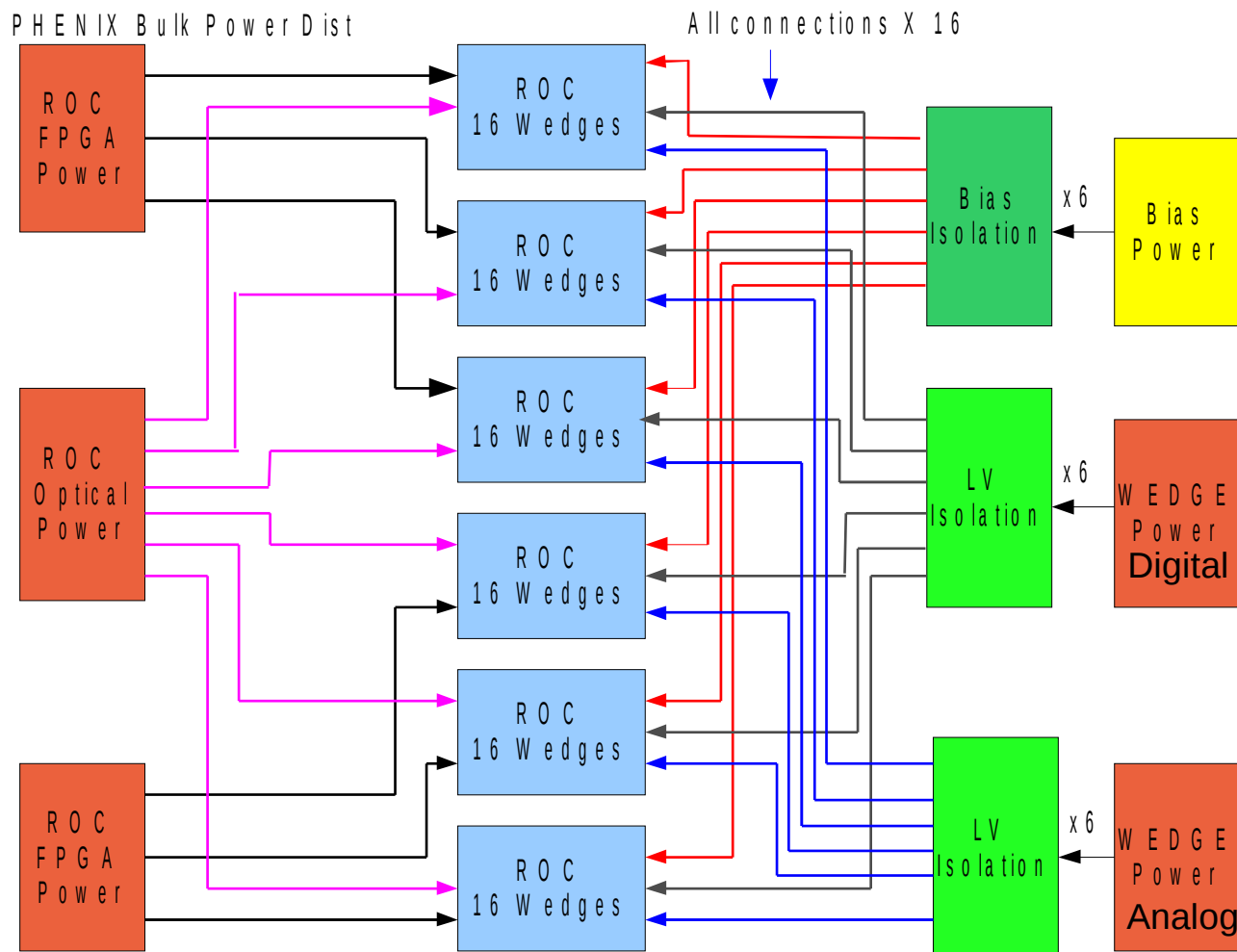
Global Power and Ground



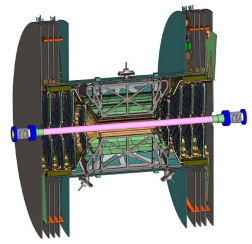
Power and Ground



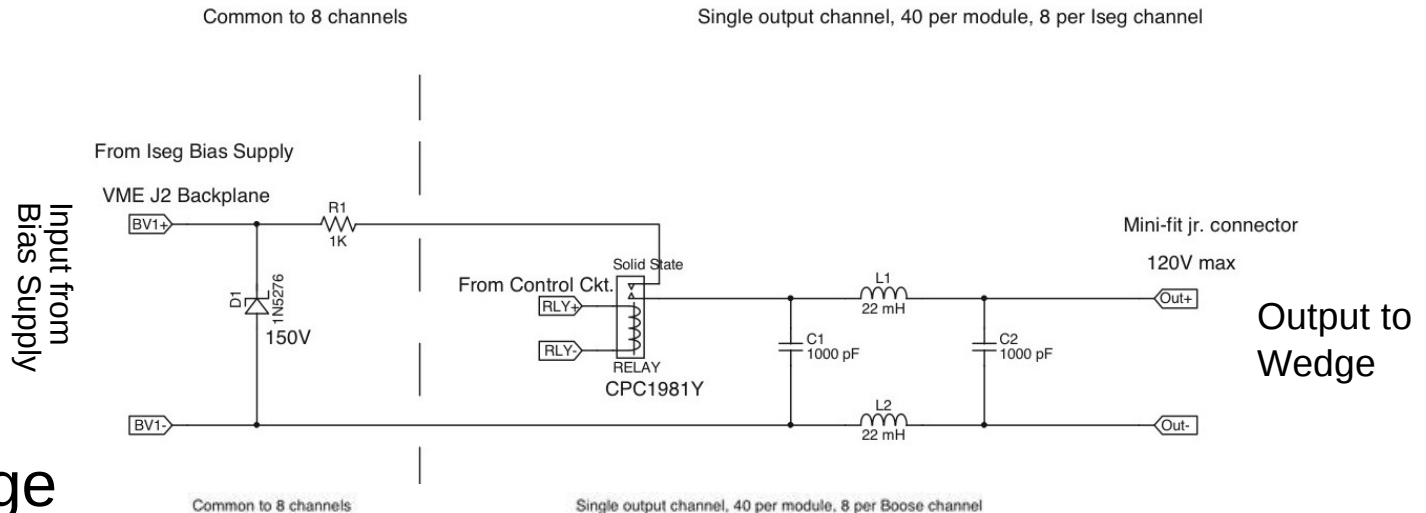
Power for
 $\frac{1}{4}$ FVTX



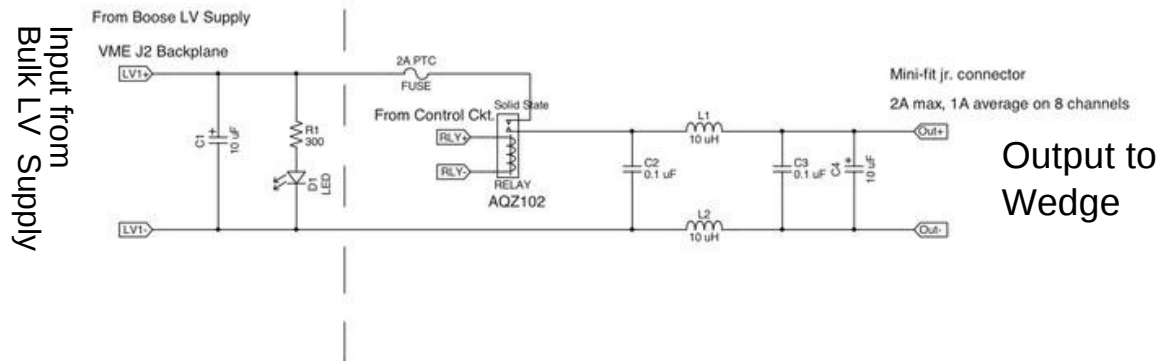
Wedge Power Isolation



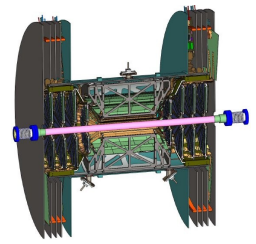
Bias Isolation



Low Voltage Isolation

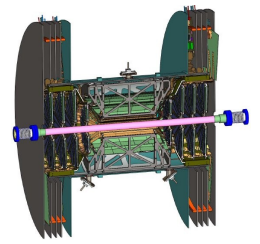


Power and Ground

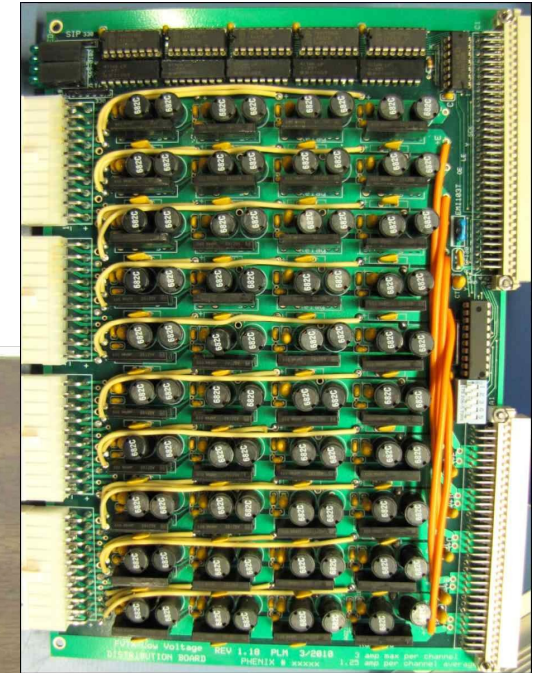


- Wedge Bias and LV isolation distribution
 - Custom isolation modules
 - Single input provides 8 switchable outputs
 - 5 Inputs per modules, provides 40 outputs
 - Similar design for both LV and Bias
 - 10 (+2 spares) Bias Modules
 - 20 (+4 spares) LV modules
 - Ethernet based crate controller provides switching of individual bias and LV channels
 - Modules reside in VME crates
 - 3 Crates: Bias, LV North and LV South
 - Custom back plane communications
 - All modules have been designed and prototyped
 - Production quoting in progress

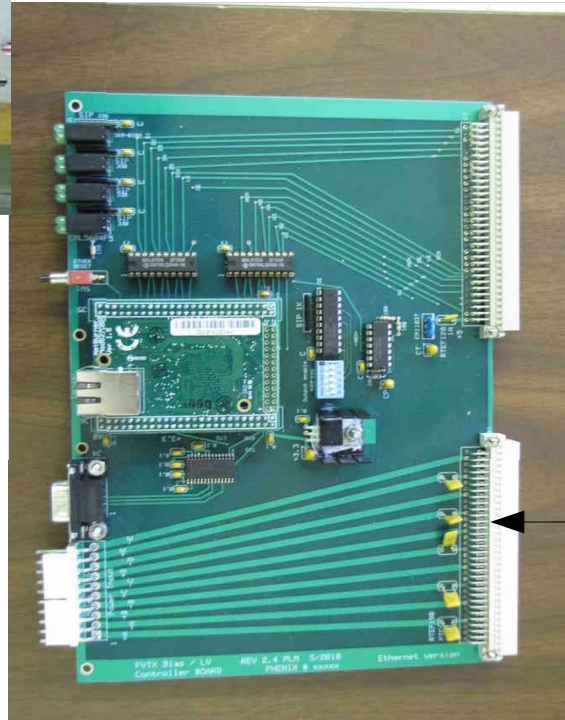
Power and Ground



LV Distribution
Module →

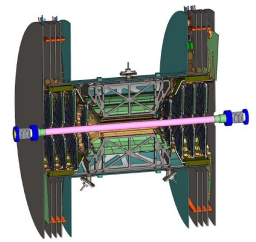


PHENIX Standard
Distribution Crate



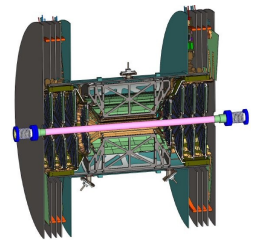
← Crate Controller
Preassembly

Power and Ground



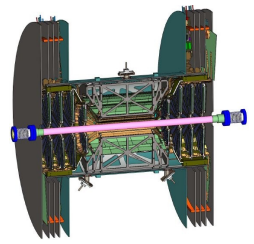
- Bias System:
 - Purchased from Weiner/ISEG, Fall 2009
 - Same system as used for VTX
 - 1 MPOD Crate with controller
 - Ethernet communications
 - SNMP/OPC software interfaces for control and monitoring
 - 4 Distribution modules
 - 16 Channels per module
 - 0-500V with current and voltage monitoring
 - Channels are isolated from each other
 - Currently at LANL for preliminary testing
 - Can be used for system testing prior to installation
 - Control software is a modification of VTX software

Power and Ground



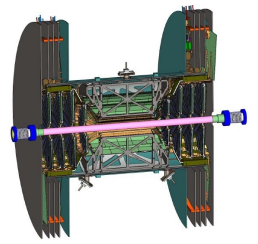
- Low Voltage:
 - Primary distribution using PHENIX Standard LV distribution
 - Uses Vicor MegaPaks to provide LV
 - Bulk supplies are electrically isolated from each other
 - Purchased fall of 2009
 - LV is distributed through PHENIX distribution modules
 - 10 channels per module
 - Individual switching and monitoring
 - Common voltage and returns in each module
 - Modules electrically isolated from each other
 - Fabricated fall spring of 2010
 - Available for system testing at 510/1008
 - Control software is a PHENIX standard- used by all PHENIX subsystems

Interlocks



- Siemens PLC system provides interlocks for LV and Bias
 - Provides interlocks of chillers and power (LV and Bias) based on humidity and temperature
 - High humidity trips chillers/LV/Bias
 - High temperature trips LV/Bias
 - Segmented by regions
 - Digital and Thermocouple inputs, digital and relay outputs
 - Automated- No operator actions required
 - Data logging using PHENIX OPC server
 - Identical to interlock system used for VTX
 - Operates independent of VTX system
 - Implementation by P. Giannotti (PHENIX Electrical Engineer)

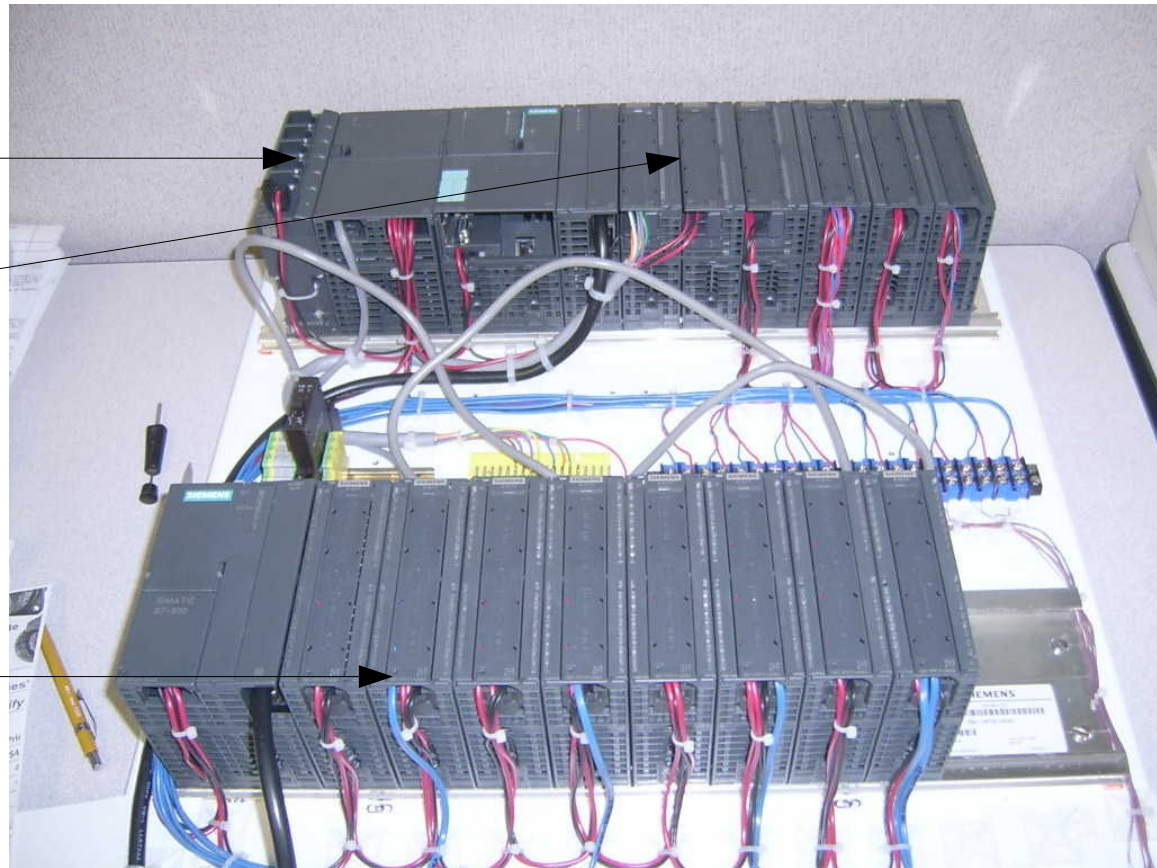
Interlocks



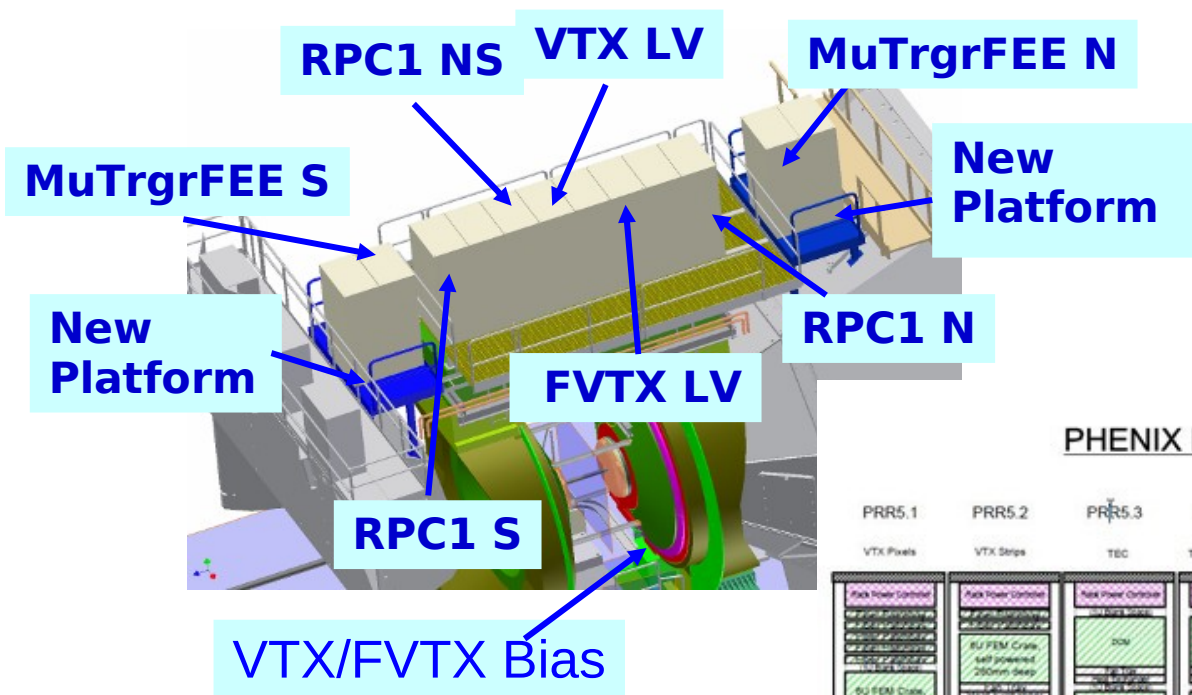
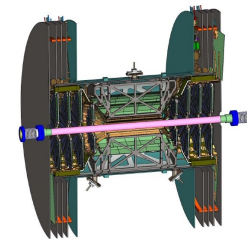
Controller

Relay Outputs

TC Inputs



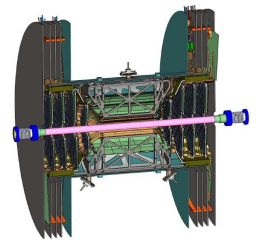
Rack Allocation in IR



PHENIX DCM Racks (Row 5)

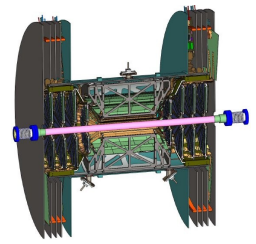
PRR5.1	PRR5.2	PRR5.3	PRR5.4	PRR5.5	PRR5.6	PRR5.7	PRR5.8
VTX Pixels	VTX Strips	TBC	TOF/MB/EmCal	??	RPC	FVTX	FOCAL?
<div> <div>Rack Power Controller</div> <div>6U FEM Crate, 250mm deep</div> <div>6U FEM Crate, 250mm deep</div> <div>6U FEM Crate, 250mm deep</div> </div>	<div> <div>Rack Power Controller</div> <div>6U FEM Crate, self powered, 250mm deep</div> <div>6U FEM Crate, self powered, 250mm deep</div> <div>6U FEM Crate, self powered, 250mm deep</div> </div>	<div> <div>Rack Power Controller</div> <div>DCM</div> <div>DCM</div> <div>DCM</div> <div>DCM</div> </div>	<div> <div>Rack Power Controller</div> <div>DCM</div> <div>DCM</div> <div>DCM</div> <div>DCM</div> </div>	<div> <div>Rack Power Controller</div> <div>DCM</div> <div>DCM</div> <div>DCM</div> <div>DCM</div> </div>	<div> <div>Rack Power Controller</div> <div>DCM</div> <div>DCM</div> <div>DCM</div> <div>DCM</div> </div>	<div> <div>Rack Power Controller</div> <div>6U FEM Crate</div> <div>6U FEM Crate</div> <div>6U FEM Crate</div> </div>	<div> <div>Rack Power Controller</div> </div>
VTX		DCM II			FVTX		

DCM-2 Status



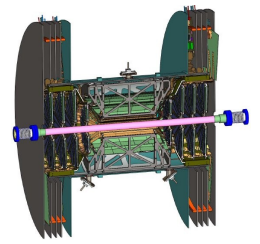
- DCM-2
 - Upgrade to PHENIX DAQ interface
 - Optical fiber connections
 - 8/10 bit encoding, 1.6 Gbs
 - Optical interface complete
 - Implemented as daughter board using current DCB
 - Available for system chain test
 - Fabrication complete, Nov 8, 2010
 - Final testing in progress @ Nevis
 - Delivery of tested boards to 1008, Nov 22, 2010
 - Will be used for VTX in Run 11

Installation Plan



- LV Rack assembled in 1008 lab
 - Rack assembly to start 2QFY11
 - Rack available for 1008 testing
- Bias system assembled in 1008 lab
 - Available for 510/1008 testing
- Bias/LV cabling
 - Procure bias and LV cables in 2QFY11
 - Cable assembly by PHENIX techs to start when materials in hand
- FEM Rack
 - Prep FEM rack in rack room, 2QFY11
- Optical Fibers
 - Procure and prep for installation, 2QFY11

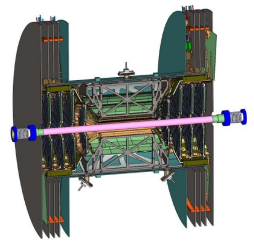
Installation Plan



- During 2011 summer shutdown :
 - Move LV rack onto magnet bridge and make service connections
 - AC Power
 - Water Cooling
 - Safety systems
 - Relocate bias system to Bias rack in the IR (rack shared with VTX)
 - Preliminary pulling of all cables (LV, Bias, Fiber, Interlock) in preparation of final installation
 - Installation of interlock system
- All work coordinated with PHENIX Integration Group (D. Lynch)

Summary

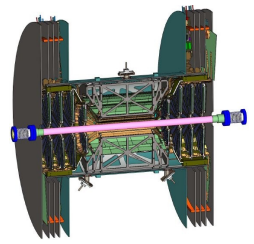
WBS 1.8



- Electronics review procedures in place
- Bias Voltage system purchased
- LV Voltage system purchased
- Power distribution boards designed
 - Prototype testing in progress
 - Fabrication in 2QFY 11
- Interlock system design in progress
 - Similar to VTX interlock system
 - Component procurement 3Q FY11
- DCM-2 production complete and testing in progress
 - Exercised with VTX in RUN 11 (Upcoming run)

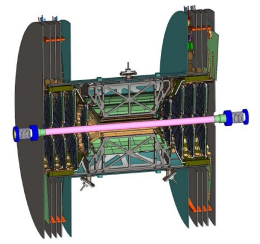
Summary

WBS 1.8

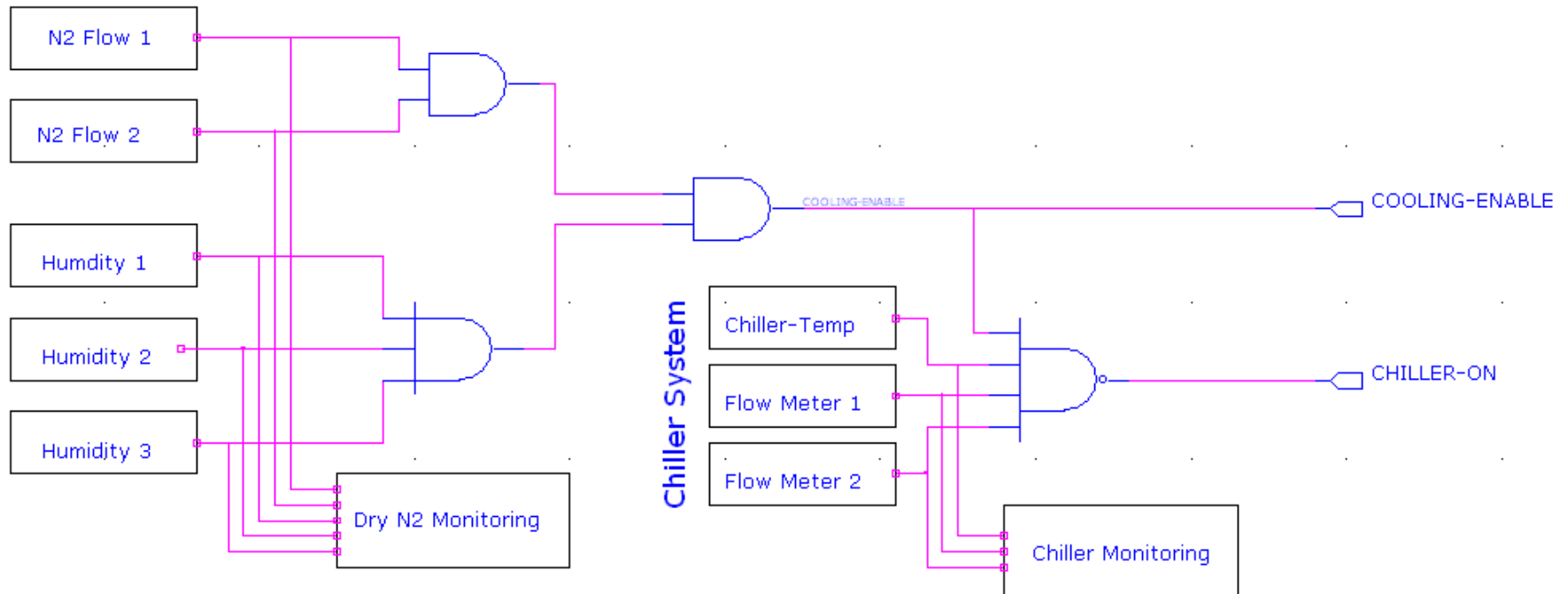
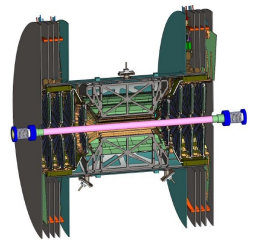


- Rack space for all equipment assigned
 - FEM rack installed
 - LV rack assembled spring 2011, installed after current run.
 - Bias Rack shared with VTX, installation complete
- Online software
 - Bias/LV control based on VTX
 - Run Control software development to start early 2011
- Power cables (LV/Bias) and optical fibers
 - Purchased 2QFY11
 - Installed during next shutdown.

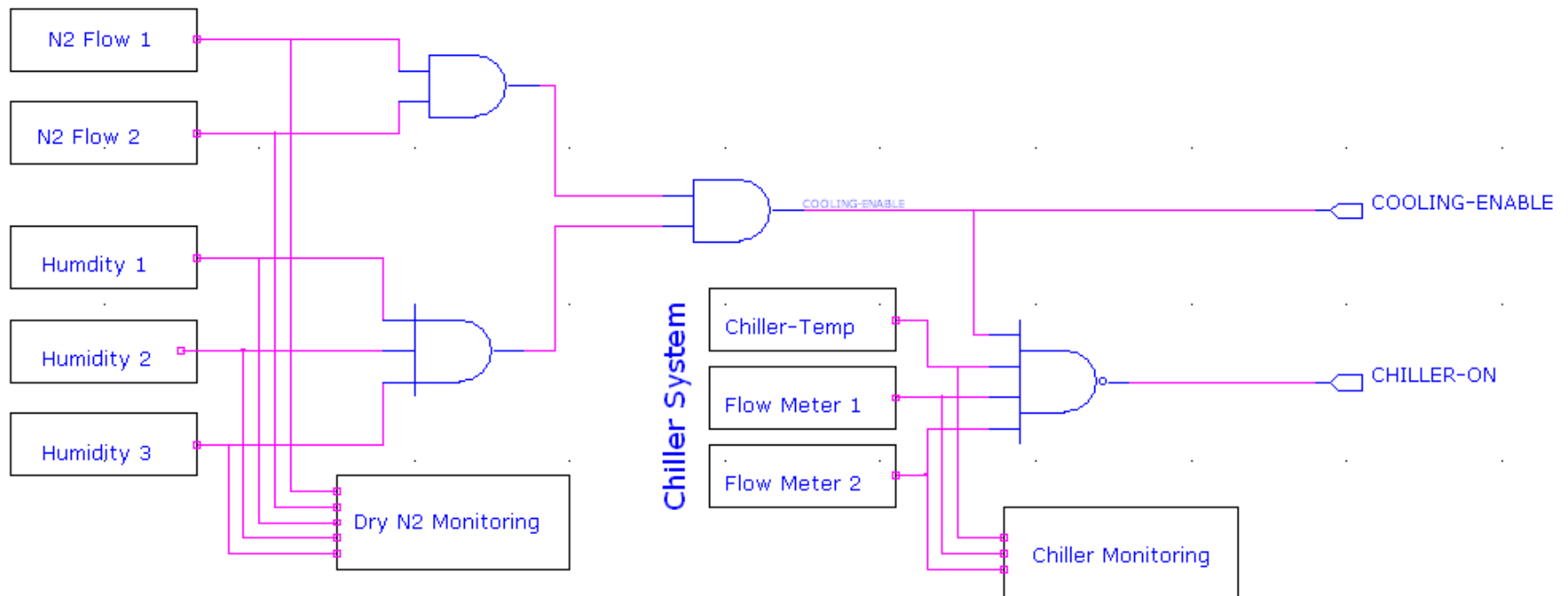
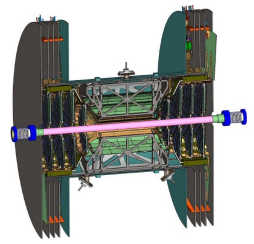
Back Up Slides



Interlocks



Interlocks



Interlocks

